Sona-Graph 6061-A

KAY ELECTRIC CO.

OPERATOR'S MANUAL
ISSUE A

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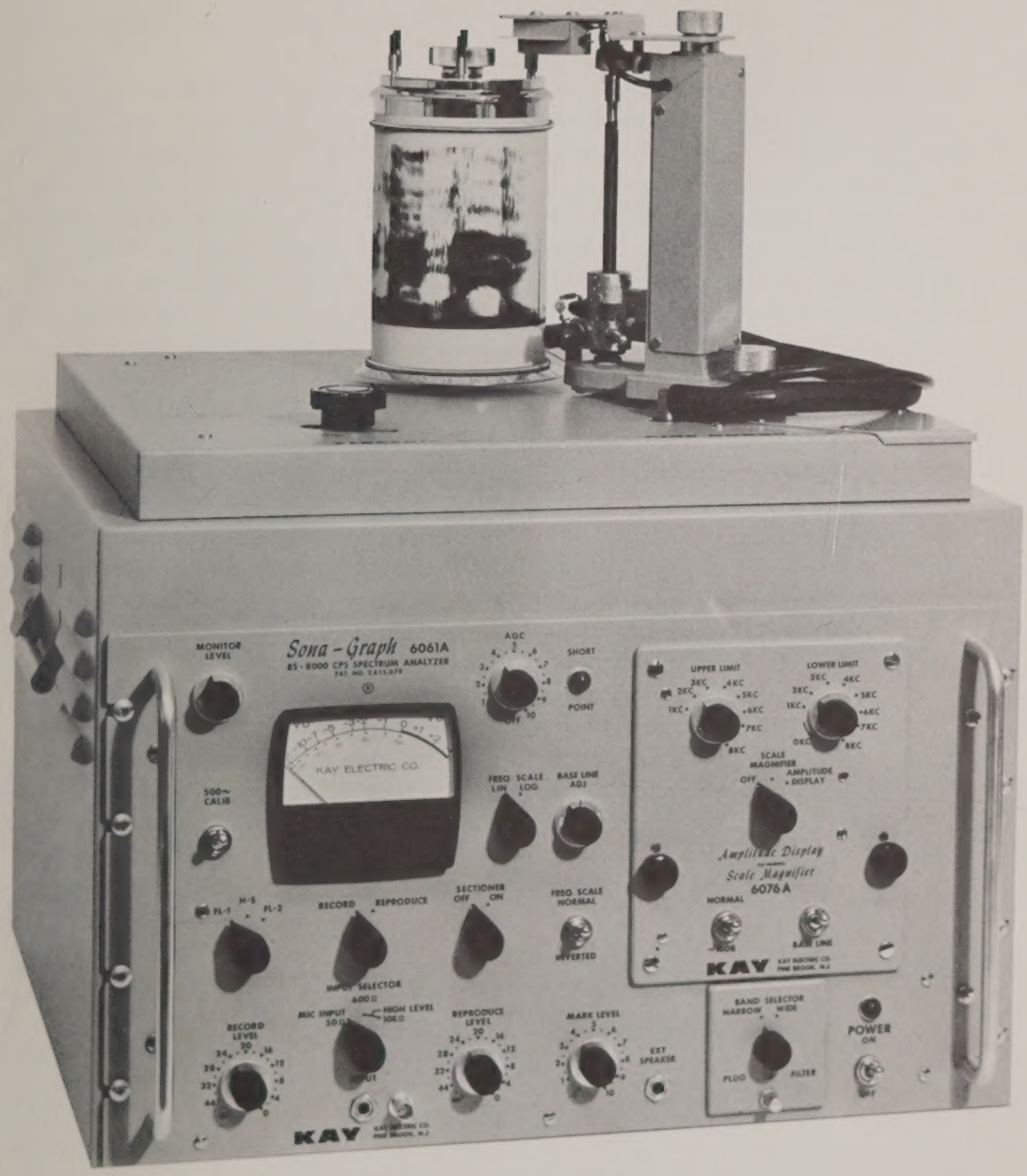

SONA-GRAPH 6061A

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PINE BROOK, NEW JERSEY
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SECTION I
GENERAL INFORMATION

1.1 INTRODUCTION

The Sona-Graph 6061-A is an audio-frequency spectrum analyzer that produces permanent, graphic recordings of any type of complex wave in the range of 85 to 8000 CPS. Unlike conventional spectrum analyzers, the 6061-A permits three different analyses to be displayed; the operator can select the display that most accurately shows the parameters he is studying. The #1 display gives an overall, three dimensional picture of the signal being analyzed; frequency, amplitude and time are represented simultaneously on one display. This pattern (a Sonagram) can be seen in Fig. 1-1A. The second type of analysis, a #2 display, permits the individual intensity of each frequency component to be displayed at any preselected point in time. This type of pattern is referred to as a Section, and a sample is shown in Fig. 1-1B. The third analysis that can be performed is similar to an oscilloscope display; it shows the average amplitude of all frequencies present, relative to time. With this pattern, the entire input signal can be examined for flatness, resonance peaks, or any amplitude study relative to time (see Fig. 1-1C). This pattern will be referred to as a #3 display.

This unit will display any 2.4 second portion of audio in the 85 to 8000 CPS range. The input signal is first recorded on a continuous tape, and then played back at a high speed during the analysis process. A frequency-heterodyne technique is used for the scanning system, and there are two plug-in filters available for increased flexibility. The narrow filter emphasizes frequency resolution, and the wide filter emphasizes time resolution (Fig. 1-1F). A built-in calibration tone generator can provide frequency markers every 500 CPS along the frequency scale of the pattern, simply by depressing a switch (Fig. 1-1E).

An adjustable AGC control is present, and can be used to extend the dynamic range of the pattern (Fig. 1-1D); also the darkness of the pattern can be adjusted to obtain the best contrast. For monitoring purposes, a VU meter and a speaker can be used simultaneously either when recording the input signal or when performing the analysis.

1.2 INSTALLATION

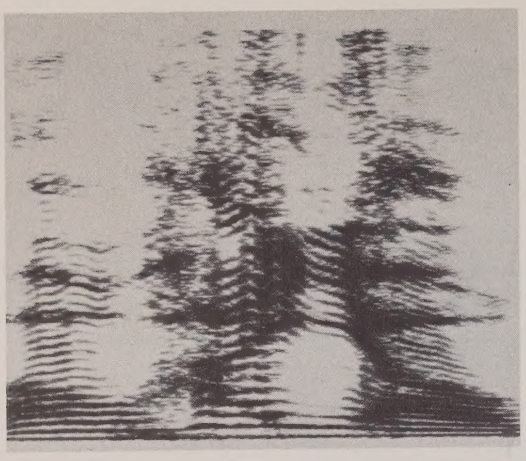
Unpacking: After removal of packing cases and protective paper wrapping, the equipment should be visually checked for physical damage. Then check the packing case to insure removal of all items shipped. Any shortage or damage should be reported to the carrier and Kay Electric Company.

To prevent damage during shipment, the RECORD-OFF-REPROD shift lever, the turntable, the small drum, and the RECORD-REPRODUCE and ERASE heads are locked in place. To ready the unit for operation:

(a) Remove the shift lever knob, using a #10 allen wrench, lift off the red packing plate, and replace the knob.

(b) Loosen the knurled-head locking screw located at the base of the stylus housing. DO NOT REMOVE THIS SCREW ENTIRELY.

(c) Remove the large knurled nut located on the top of the drum. Remove the small knurled nut from the top of the stylus housing, noting its position. Remove the retainer plate and felt pads. Place the spring on the shaft that holds the small knurled nut. Reverse the position of the knurled nut and after ascertaining that it is prop-



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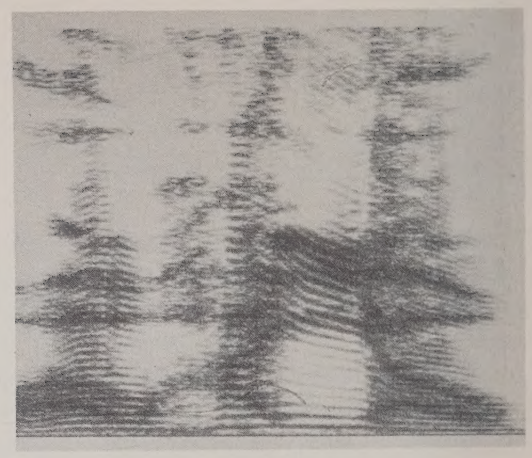

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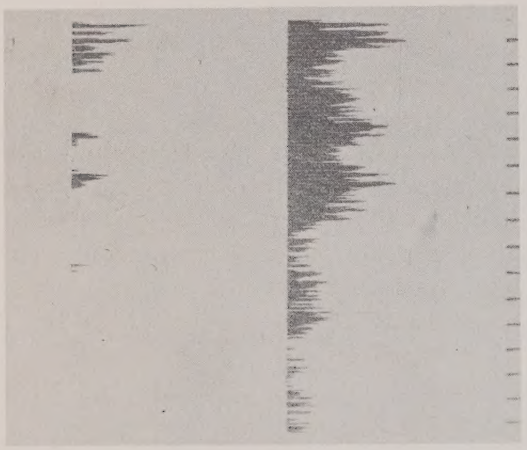

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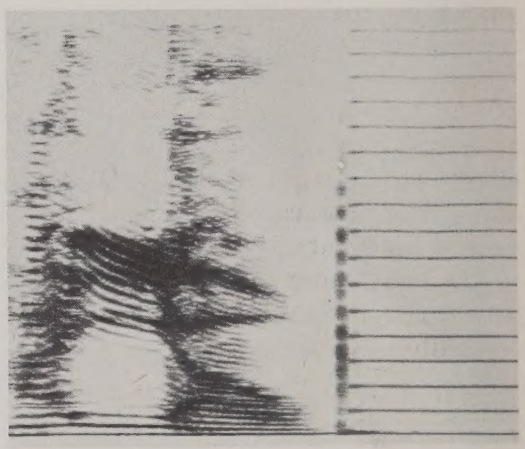

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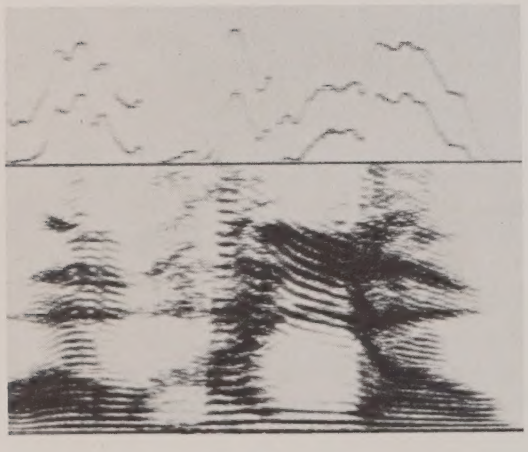

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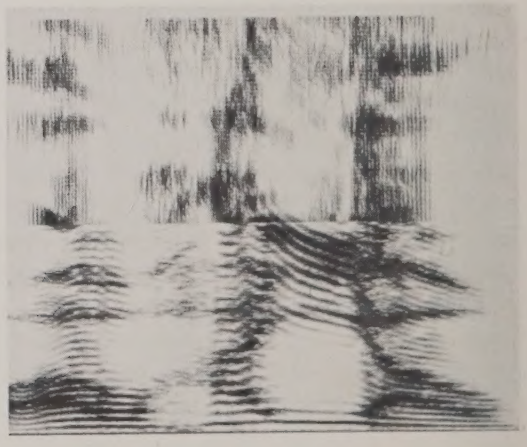

F

FIG. 1-1 TYPICAL DISPLAYS

erly seated on the spring, tighten it securely.

(d) Remove the six magnetic pins from their plastic shipping container (six additional pins are provided for use with the large drum) and insert them in the storage holes near the center of the micrometer plate.

(e) Remove the four 4-40 screws from the cover plate over the RECORD - REPRODUCE head. Carefully remove packing material from the heads, and replace the cover plate.

Operating Notes: The Sona-Graph is completely self-contained; merely connect the line cord to a source of 117 volts AC, connect the microphone, fasten a sheet of Sonagram paper to the drum and you are ready to begin operation. As in the case of any general purpose laboratory instrument, the 6061-A should be kept free of excessive vibration, humidity, and temperature variation. (Note: Both the 6076-A and Dummy Plug-In units have AC interlocks; either unit must be installed before operation. See Fig. 1-2).

Installation of the Large Drum: Remove the four screws holding the corner cover plate, and lift off the cover. Then loosen the stylus lock screw and slide the stylus housing all the way back; retighten the stylus lock screw. Loosen the sectioner plate lock nut and swing back the sectioner plate. Finally, remove the drum lock nut, micrometer plate, and the small drum. When lifting the small drum, avoid raising the turntable since this may damage the recording head.

Slowly lower the large drum down the shaft until it seats. Install the large micrometer plate back into position. Loosen the front screw, holding the reed switch block and pointer, and slide the pointer to the extreme position away from the stylus housing. The reed switch tip should now be set within 1/16 inch of a magnetic pin placed in one of the holes around the top of the drum. Tighten down the front holding-screw.

This unit comes equipped with 12 magnetic pins. Two pins should be installed in adjacent holes at each desired position. Set the stylus wire to the exact point that you want to section; then, install a pin in the hole indicated by the pointer and one in the next hole clockwise. If you should revert back to the small drum, swing the pointer back to its closest position.

Removal of 6076-A and Dummy plug-in units:

(a) Loosen the pawl fasteners, located on either side of the plug-in front panel, by turning the fastener knobs in a counter-clockwise direction. (2 or 3 turns should free each lock).

(b) Grasp both knobs simultaneously and slide the plug-in out of the cavity. When replacing the plug-in, use the reverse of the above procedure. Do not attempt to secure the plug-in until it is properly seated in the cavity. (i.e. - Flush with the front panel of the 6061-A).

Removal of the plug-in filter:

(a) Loosen the pawl fastener, located beneath the band selector switch, by turning the fastener counter-clockwise.

(b) Slide the filter out of its cavity. Reverse procedure to replace filter.

1.3 SPECIFICATIONS

Frequency Range: 85 to 8000 CPS.

Frequency Response: Within 4 DB over entire range.

Analyzing Filter Bandwidths: 45 and 300 CPS at 3 DB down.

Recording Time: Any 2.4 second interval of input signal.

Analysis Time: 1.3 minutes.

Amplifier Characteristics: Flat or approx. 13 DB high-frequency pre-emphasis.

Input Impedance: 50, 600, or 10,000 ohms, switchable.

Recording Medium: Magnetic film around periphery of turntable.

AGC Range: Will compress 20 to 40 DB down to 10 DB.

Intensity Range During Section: 35 DB.

Displays Available: #1 Display - Frequency-vs-amplitude-vs-time.
#2 Display - Amplitude-vs-frequency.
#3 Display - Amplitude-vs - time (with 6076-A plug-in).

Aspect Ratio of Sonagram: Small Drum - 4" x 12".
Large Drum - 4" x 37.25".

Frequency Calibration: Calibration lines available at 500 CPS intervals.

Microphone Supplied: Altec-Lansing 633-A, dynamic.

Power Supply: Input approximately 100 watts, 117 volts, 50/60 CPS.

Dimensions: 25"H x 20"W x 18½"D.

Weight: 105 lb. Approximate.

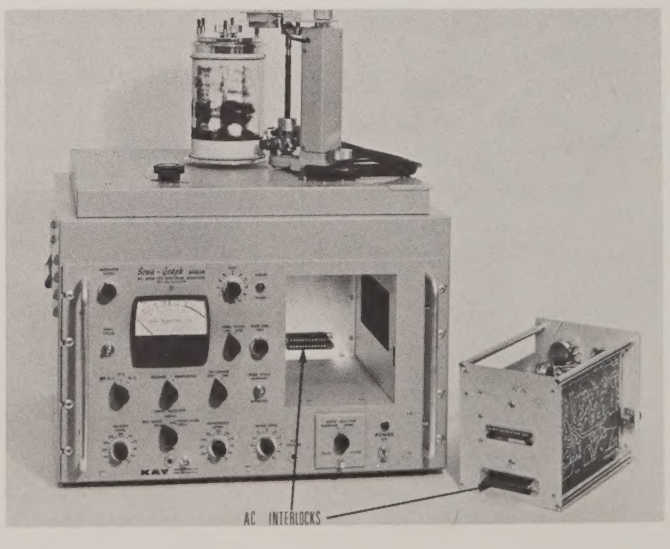

FIG. 1-2

SECTION II
DESCRIPTION

The Sona-Graph 6061-A is a completely solid-state sound spectrograph with all its necessary systems enclosed in one cabinet. This instrument consists of three basic systems; the drive mechanism for the turntable and drum, the electronic circuitry of the amplifier-analyzer, and the regulated power supply. In order to have a compact unit, and at the same time provide accessibility to all circuits, plug-in type component boards have been used wherever practical.

2.1 OPERATING CONTROLS AND FEATURES

CONTROLS	POSITION	FUNCTION
POWER switch (S-10)	ON	Line voltage is applied to power supply. Pilot light is on.
	OFF	Instrument is completely de-energized.
INPUT SELECTOR switch (S-3)	MIC INPUT	Provides a 50 ohm matching impedance for microphone.
	HIGH LEVEL	Provides separate 600 and 10K ohm input impedances.
RECORD-REPRODUCE switch (S-5)	--------	Selects mode of operation of amplifier-analyzer system.
RECORD LEVEL control (R-4)	Stepped Variable	Provides an adjustment of the record amplifier gain, in 2 DB increments.
REPRODUCE LEVEL control (R-5)	Stepped Variable	Provides an adjustment of the reproduce amplifier gain, in 2 DB increments.
FL-1 - HS - FL-2 switch (S-4)	FL-1	Provides an overall response, flat within 4 DB.
	HS	Provides a high-frequency pre-emphasis in the record circuits.
	FL-2	Pre-emphasis is added during recording and equalized in the reproduce circuitry to provide a linear response.
MONITOR LEVEL control (R-1)	Variable	Controls the audio output at the speaker.
500 CPS CALIBration switch (S-6)	Momentarily Depressed	Provides calibration marks at 500 CPS intervals on the frequency scale of the Sonagram.

CONTROLS	POSITION	FUNCTION
BAND SELECTOR switch (S-1001)	NARROW	Provides bandwidth of 45 CPS at 3 DB down points.
	WIDE	Provides bandwidths of 300 CPS at 3DB points.
SECTIONER switch (S-9)	OFF	Enables a #1 display to be produced on the Sonagram.
	ON	Energizes the Sectioner circuits to provide a #2 display. Disables AGC circuits.
FREQ SCALE switch (S-8)	--------	Provides a means of inverting the frequency presentation.
AGC switch (S-10)	--------	Concentrically part of the AGC control, this switch permits the AGC to be turned off.
AGC control (R-2)	Variable	Compresses the maximum recorded signal to 10 DB, the limit of the Sonagram paper.
BASELINE ADJust control (R-3)	Variable	Enables the position of the baseline to be adjusted on the Sonagram.
MARK LEVEL control (R-6)	Variable	Controls the darkness of the Sonagram.
FREQ SCALE LIN-LOG switch (S-7)	--------	Enables the frequency scale to have a linear or logarithmic presentation.
VU meter (M-1)	--------	Provides a visible means of monitoring the record and reproduce gain.
SHORT POINT indicator (I-1)	--------	This lamp glows when the stylus control is at the bottom and the top of the Sonagram; at this point the Marking amplifier circuitry is disabled and no mark will appear on the Sonagram.

TERMINAL	FUNCTION
INPUT jack (J-1401)	This is the input to the record amplifier circuitry.
EXT SPEAKER jack (J-13)	Provides an output for a remote speaker.

2.2 MECHANICAL UNIT

This section describes the controls and features of the mechanical portion of the 6061-A.

Most of these items are visible on the top of the Sona-Graph, and are called out in Fig. 2.1. Some of the more important features are explained below. Items that are not visible on the top of the unit are marked with an (*).

FEATURES	DESCRIPTION
RECORD-OFF-REPROD (Mechanical Shift Lever)	Controls the application of power to the two-speed drive system and blower motors, and activates the control circuits for the recorder. When set to RECORD, the turntable rotates at 25 rpm; when set to REPROD, the rotation is 300 rpm, and when set to OFF, all movement ceases.
Stylus Control Lever	Engages the Stylus Assembly with the lead screw and stylus wire with the paper.
Micrometer Plate	This plate can be used to divide the time of the recorded chart into 300 units (for Sectioning purposes). It provides four intermediate settings between each pin hole.
Neon Baseline Indicator (I-2)	This lamp glows when the stylus is at the baseline frequency, and acts as an amplitude monitor of the modulated signal as the stylus moves up to the lead screw.
Stylus Adjust Screw	If the stylus wire becomes worn, this screw can be used to readjust the length and pressure of the wire on the Sonagram paper. Since there is a HIGH VOLTAGE on this adjusting screw, TURN OFF the 6061-A before attempting adjustment.
Blower Motor*	This is used to remove the smoke caused by the burning of the Sonagram paper.
Alarm Buzzer*	Sounds when the 6061-A is turned off while the Shift Lever is left engaged in either the record or reproduce position. This prevents flat spots from occuring on the idler wheel.

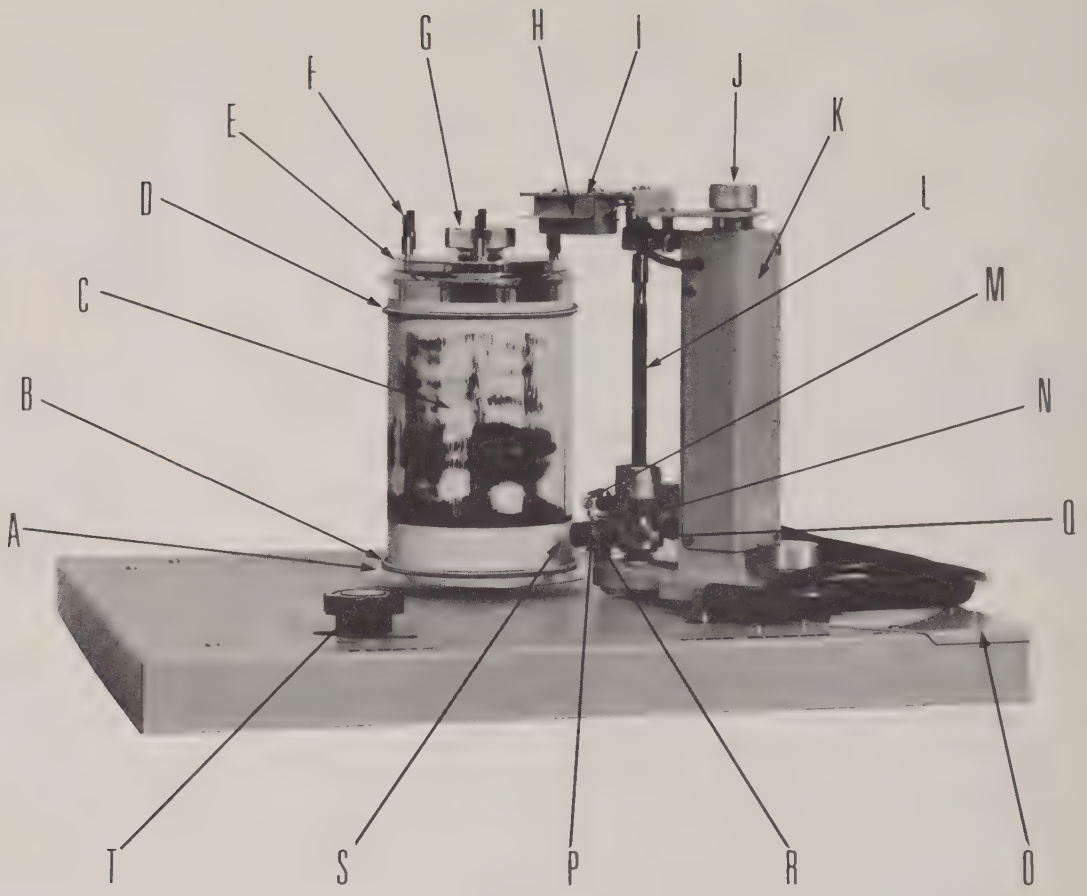

FIG. 2-1

A - INDEX PLATE

B - PAPER-HOLDING SPRING

C - SMALL DRUM (WITH SONAGRAM)

D - PAPER-HOLDING SPRING

E - MICROMETER PLATE

F - SECTIONER PIN

G - DRUM LOCK-NUT

H - REED SWITCH ASSEMBLY

I - SECTIONER PLATE

J - SECTIONER PLATE LOCK-NUT

K - STYLUS HOUSING

L - LEAD SCREW

M - NEON BASELINE INDICATOR

N - STYLUS ASSEMBLY

O - CORNER COVER PLATE

P - STYLUS LOCK SCREW

Q - STYLUS CONTROL LEVER

R - STYLUS ADJUST SCREW

S - STYLUS

T - MECHANICAL SHIFT LEVER

SECTION III
OPERATING INSTRUCTIONS

PRELIMINARY:

(a) Set the Sonagraph power switch to the OFF position.

(b) Insert the power cord in the receptacle at the rear of the unit and turn it clockwise. Plug the other end of the line cord into a 117 volt, 50/60 CPS source.

(c) Pull the stylus control lever away from the drum and lower it to the bottom of the stylus lead screw.

(d) Insert a magnetic pin in one of the sectioner holes (around the top of the drum). Slowly turn the drum by hand and see that there is a clearance of within 1/16 of an inch between the pin and the reed switch at the top of the stylus housing.

(e) Now, set these controls as shown:

1. Mechanical Shift Lever - OFF
2. SECTIONER switch - OFF
3. MARK LEVEL control - 0
4. REC-REP switch - REPRODUCE

(f) Turn the power switch to ON, and allow the unit a few minutes warm-up time to stablize the circuits.

3.1 RECORDING THE SIGNAL

A. Set the INPUT SELECTOR to the position best suited to the output impedance of your signal source.

B. Plug the output of your signal source into the INPUT jack.

C. Set the FL-1 - HS - FL-2 switch to desired position. (The HS position is generally used for analyzing voice patterns.)

D. Set the RECORD LEVEL control to approximately 44.

E. Place the Mechanical Shift Lever in the RECORD position.

F. Turn the RECORD REPRODUCE switch to RECORD.

G. Turn up the RECORD LEVEL control until you get a 0-VU average reading or +3 VU on signal peaks. (For convenience, the level controls are calibrated in 2 - db steps.)

H. Since a total of 2.4 seconds of one signal (one revolution of the drum) may be recorded, turn the REC-REP switch to REP immediately after this interval is complete. If you do not switch to REP by the end of the 2.4 seconds, the signal recorded will be erased.

I. The recorded signal will now be reproduced repititively and may be monitored by advancing the MONITOR GAIN control until a convenient volume is obtained.

3.2 INSERTING FREQUENCY MARKERS

The calibration tone is 500 CPS; it will produce harmonics every 500 CPS up to 8 KC. You can record this tone either when you initially record the input signal or after you have switched to the reproduce mode.

A. If you are recording the input signal and you want to provide calibration, merely depress the CALIB switch momentarily, and the frequency markers will be recorded along with the signal.

B. If you have already recorded a signal and you wish to calibrate, listen to the signal being played back. Then depress the CALIB switch momentarily between the end and beginning of the recording; if you press the CALIB switch during the recorded material, erasure of this material will occur.

C. Please note that when you depress the CALIB switch, you energize the record circuits of the Sona-Graph. Therefore, if there is a signal at the INPUT jack, it will be recorded along with the calibrate tone.

3.3 SETTING THE BASELINE

A. Place the Mechanical Shift Lever in OFF position and lift the stylus holder to the point at which the SHORT POINT light just goes out. Partially engage the stylus but avoid letting the wire touch the drum.

B. Turn the AGC control to zero (minimum agc).

C. Place the BAND SELECTOR switch in the NARROW position, and set the MARK LEVEL control at about (4).

D. Select either a LINear or LOGarithmic display, using the FREQ SCALE switch, and place the INVERTED - NORMAL switch in the NORMAL position.

E. Set the selector switch (on 6076-A plug-in units) in OFF position.

F. Rotate the BASELINE ADJUST control until the BASELINE INDICATOR lights. This adjustment insures the positioning of the baseline at the bottom of the pattern.

G. Return the stylus holder to the bottom of the lead screw.

3.4 FASTENING SONAGRAM PAPER

A. Adjust the MONITOR GAIN control for a convenient volume level, while manually rotating the drum.

B. Rotate the drum until a switch click is heard; this indicates the end of the recorded signal.

C. Look at the index plate at the bottom of the drum, and note the number which is opposite the stylus wire.

D. Push both of the springs down so they rest on the bottom flange of the drum.

E. Place a fresh piece of Sonagram paper around the drum with the coated side facing outward. Bring the edges forward and place the edge held in your left hand over the edge held in your right.

CAUTION: Placing the paper on the drum in the wrong direction will cause the stylus to pick up and tear the paper. It also may cause the stylus to be damaged.

F. While holding the paper firmly around the drum, push it down until it stops against the bottom flange. Then raise the top spring to secure the upper edge of the paper.

G. Rotate the paper on the drum until the overlap is directly over the index number noted in Step C.

3.5 PRODUCING THE SONAGRAM (#1 DISPLAY)

A. Using the AGC control, select the desired amount of agc action. A minimum setting of the control permits signals approximately -20 db down from the reference level to be displayed on the pattern. A maximum setting of this control will enable levels down to -40 db to be displayed.

B. Set the MARK LEVEL control for the desired pattern contrast. For a minimum agc setting, a mark level of (4) should be sufficient; a level of about (7.5) should provide proper contrast for maximum agc settings.

C. Set the Mechanical Shift Lever to the REPRODUCE position.

D. Adjust the REPRODUCE LEVEL control for a reading of -2 on the VU METER.

E. The BAND SELECTOR switch may be set to either the NARROW or WIDE position.

F. Lift the stylus slightly and engage it with the lead screw making sure the stylus wire is touching the paper. (Avoid leaving the stylus close to the paper with the MARK LEVEL at a high value. Arcing could occur, causing stylus damage.)

G. Allow the stylus to travel up the paper until the upper SHORT POINT indicator lights.

H. Disengage the stylus and return it to the bottom of the lead screw.

3.6 TAKING A SECTION (#2 DISPLAY)

A SECTION gives an amplitude-vs-frequency display at a preselected point in time. The SECTIONER MICROMETER PLATE (Fig. 3-1) is divided into 300 units, eight milliseconds apart; a section may be taken at any one of these points.

A. Make a #1 display as described previously. Do not remove the completed Sonagram from the drum. Determine the point or points where you wish to see the sections. (A maximum of (6) sections may be made at one time, since each section requires a 2" segment of the Sonagram paper.)

B. With the stylus at the bottom of its travel, manually rotate the drum and turntable assembly until the tip of the stylus wire is exactly in line with the point to be sectioned.

C. Loosen the knurled knob holding the micrometer plate.

D. Insert a magnetic pin in the hole in the micrometer plate nearest to the pointer, and holding the drum and turntable in place, rotate the micrometer plate until the pin is exactly in line with the pointer.

E. Tighten the knurled knob.

F. Additional pins may be inserted, but the spacing between pins may not be less than (10) holes. The section will be taken at the point where the stylus rests on the paper when a pin passes the pointer.

G. For future reference, mark the Sonagram at the points where the Sections are to be taken. Also note the position of the overlap on the index. (The position of the Sonagram is important when aligning the paper for a #2 display).

H. Remove the Sonagram and replace it with a new sheet of paper; carefully position the overlap at the same index point as the previous sheet.

I. Turn the SECTIONER switch to ON, the MARK LEVEL control to (4), and the BAND SELECTOR switch to NARROW.

J. Place the mechanical SHIFT LEVER in the REPRODUCE position; lift the stylus control slightly and engage the paper. When the upper SHORT POINT indicator lights, the SECTION is complete. Disengage the stylus and return it to its rest position.

K. With the FREQ SCALE switch in the NORMAL position, the frequency presentation of the SECTION will be inverted. (High frequencies will be at the bottom of the paper.)

If the operator desires a SECTION at a different point in time, with reference to the original SECTION, he must readjust the MICROMETER PLATE or magnetic pin. Both the magnetic pin holes in the MICROMETER PLATE, and the graduations in the upper portion of the drum, are 40 milliseconds apart. In addition to the 60 pin holes, the MICROMETER PLATE also contains (5) graduations on its periphery which may subdivide any or all of the aforementioned

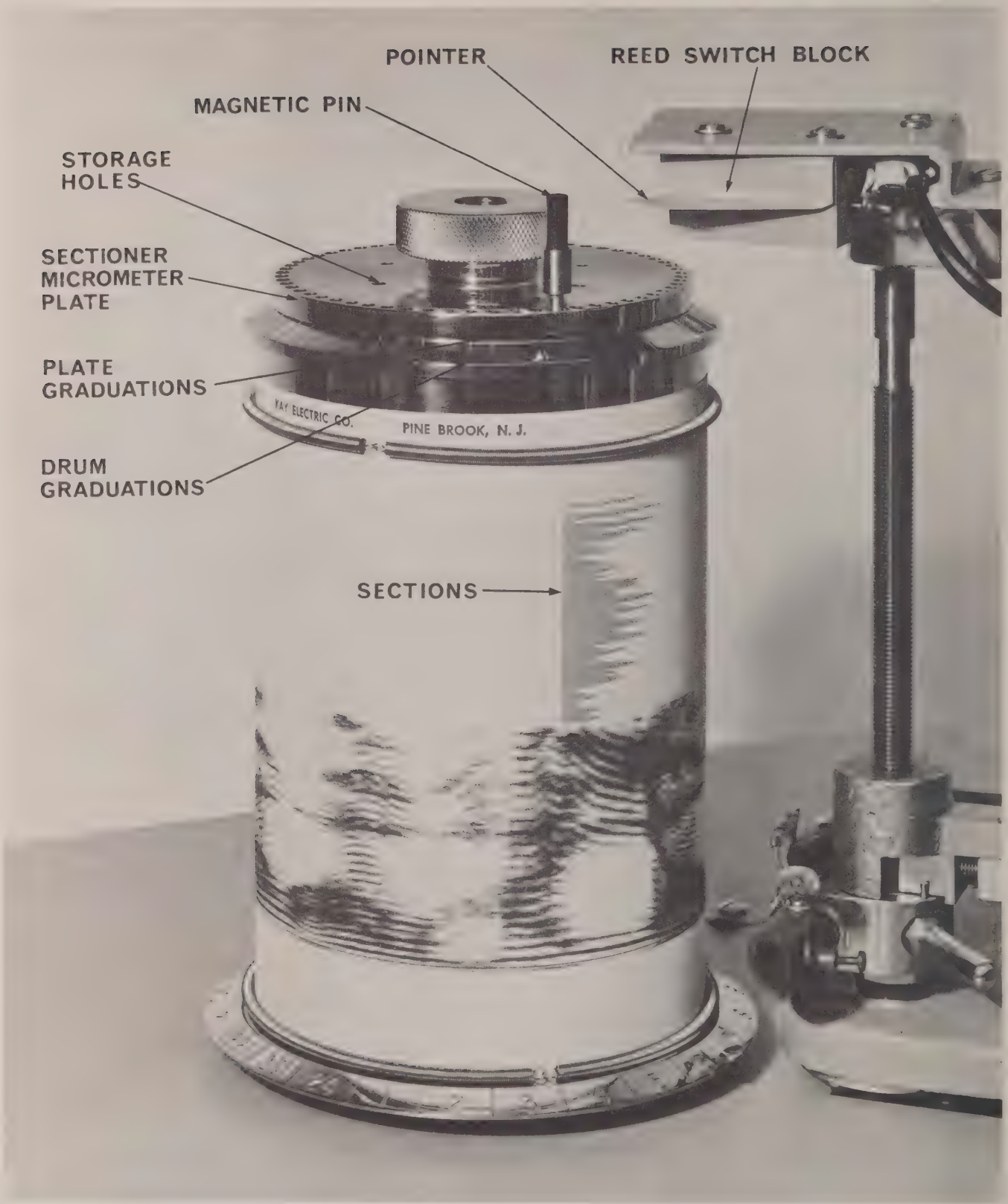
POINTER
REED SWITCH BLOCK
MAGNETIC PIN
STORAGE HOLES
SECTIONER MICROMETER PLATE
PLATE GRADUATIONS
DRUM GRADUATIONS
SECTIONS
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FIG. 3-1

holes, thus providing 300 possible divisions, 8 milliseconds apart. (300 x .008 sec. = 2.4 sec., recording time).

An example is now given to show how to set the MICROMETER. After a section run is made at a selected time (t = 0).

1) Assume it is desired to sample a place 8 milliseconds earlier (t-8milliseconds). Do this: loosen knurled knob slightly and rotate the plate clockwise, in relation to the drum below, one micrometer division. This will cause the reed switch to be closed 8 milliseconds earlier than previous setting. Tighten the large knurled knob and take the Section.

2) If a sample is desired 24 milliseconds later (i.e. t+24 milliseconds) perform this operation: loosen the knurled knob slightly and rotate the plate counterclockwise, in relation to the drum below, three micrometer divisions. This will cause the reed switch to close 24 milliseconds later than the referenced setting. Tighten the large knurled knob before taking a Section at this new point in time.

Do this for all settings up to t $\pm$32 milliseconds, and at t $\pm$40 milliseconds go to the next hole on the plate which is this same point.

L. Note the position of the recording paper on the drum. Remove completed sheet.

M. Place a new sheet of paper on the drum in the same position as the sheet just removed.

N. If Sonagrams and Sections are only to cover the range from 0 to 4KC or between 4KC and 8KC, both can be placed on one sheet of paper, with the Sonagram recorded on the lower half of the recording paper and the Section starting immediately above or vice versa (see Fig. 3-2). This can be done because the frequency scale is reversed when making a Section; consequently, the Section will start at 4KC directly above the Sonagram and end at zero frequency at the top of the recording paper.

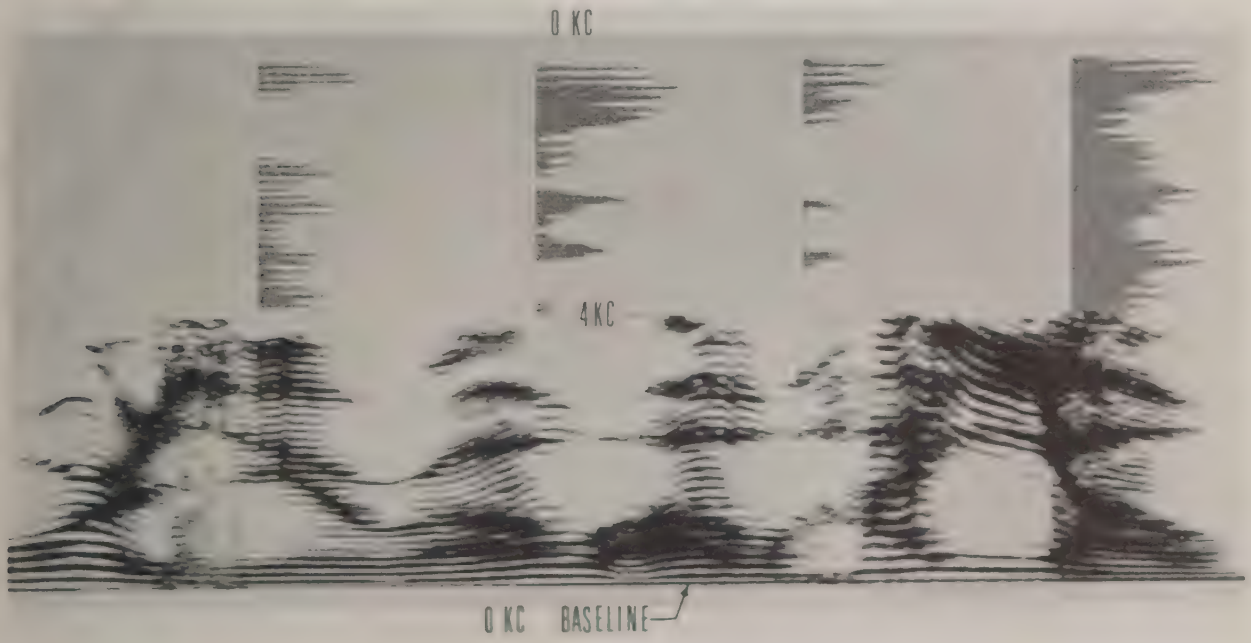


FIG. 3-2

SECTION IV
AMPLITUDE DISPLAY AND SCALE MAGNIFIER UNIT 6076-A

4.1 INTRODUCTION

This plug-in accessory for the 6061-A performs two separate functions. The AMPLITUDE DISPLAY function permits a display of the amplitude-vs-time on the upper third of the normal Sonagram. The SCALE MAGNIFIER function allows the expansion of any portion of the normal pattern to the full four inch width.

The 6076-A obtains its power from the Sona-Graph 6061-A. No external cables or adapters are necessary. A front-panel switch can be used to disable the 6076-A if normal operation of the 6061-A is desired. An attenuator is also included to reduce the overall amplitude of the pattern, when necessary, without resetting any other controls. The attenuator may be found useful if high-amplitude peaks extend beyond the upper SHORT POINT.

Installation is easily accomplished by removing the DUMMY plug-in supplied with the 6061-A, and sliding in the 6076-A plug-in.

4.2 SPECIFICATIONS

Amplitude Display:

Height of amplitude-vs-time record, $1\frac{1}{2}$ inch approx.

Dynamic range, 24 db.

Scale Magnifier:

Range of Magnification, anywhere within the entire range of the 6061-A. (0-8 kc).

Width of pattern, 4 inches.

General:

Dimensions, 6 x 7 x 10 inches.

Weight, 5.3 lb.

4.3 OPERATING CONTROLS

CONTROL	POSITION	FUNCTION
Function Switch (S-1101)	OFF	6076-A is completely bypassed.
	SCALE MAGNIFIER	SCALE MAGNIFIER function is energized.
	AMPLITUDE DISPLAY	AMPLITUDE DISPLAY function is energized.
10-db Pad (S-1102)	-10 DB (NORMAL)	Provides 10 DB of attenuation to the input of the AMPLITUDE DISPLAY.
BASELINE Switch (S-1103)	ON (down)	Inserts a baseline on the paper, in place of the signal input, to be used as a referenced line for AMPLITUDE DISPLAY patterns.
UPPER LIMIT (R-1156)	Variable	When the function switch is in the SCALE MAGNIFIER position, these controls determine the upper and lower limits of the magnification.
LOWER LIMIT (R-1159)	Variable	

4.4 OPERATION

A. Scale Magnifier

1. Place a fresh piece of Sonagram paper on the drum of the 6061-A.
2. Set the controls on the 6061-A as if a normal pattern were to be made.
3. Turn the selector on the 6076-A to the SCALE MAGNIFIER position. Set the LOWER LIMIT control for 0 KC and the UPPER LIMIT control for 8 KC.
4. Raise the stylus until the SHORT POINT indicator goes out; then partially engage it.
5. Set the AGC control (on the 6061-A) to minimum, the MARK LEVEL control to (4), and the BAND SELECTOR to NARROW.
6. Turn the LOWER LIMIT control clockwise until the BASELINE INDICATOR lights.
7. Now, adjust the UPPER and LOWER LIMIT controls for the desired frequency range. The calibration of these controls is only approximate.
8. Where precise measurements are involved, the calibration tone may be utilized.
9. Place the Mechanical Shift Lever in the REPROD position, set the MARK LEVEL and AGC controls as desired, and engage the stylus.
10. Return the stylus to the bottom of its travel when the pattern is complete.

B. Amplitude Display

1. Set up the 6061-A as if a normal pattern were to be made.
2. Turn the selector switch on the 6076-A to the AMPLITUDE DISPLAY position.
3. Place the Mechanical Shift Lever in REPRODUCE, and adjust the REPRODUCE LEVEL control to obtain -2 on the VU meter.
4. Set the MARK LEVEL control to about (4).
5. Raise the stylus assembly to a point approximately one-third the way down from the top of the paper.
6. Depress the BASELINE switch and move the stylus up or down until the BASELINE INDICATOR lights. Then lower the stylus slightly and, still holding down the BASELINE switch, engage the stylus.
7. As soon as the baseline has been marked on the paper, release the switch.
8. When the SHORT POINT indicator lights, return the stylus to its rest position.
9. If the pattern has gone off the upper limit of the paper, reduce the REPRODUCE LEVEL control or switch in the 10 DB attenuator, engage the stylus slightly above the Amplitude Display baseline, and remark the paper.

SECTION V
CHECK OUT PROCEDURE

5.1 APPLICATION

The information contained in this section can enable the operator of the 6061-A to perform a general, overall check of the unit. These check-outs can be applied whenever:

a) The unit is initially received.
b) The unit undergoes preventative maintenance.
c) Any components, component boards, plug-in-filter, or plug-in accesories have been replaced.

5.2 SECTIONER

A. Set controls as follows:

1. SECTIONER switch - ON
2. RECORD-REPRODUCE switch - RECORD
3. Mechanical SHIFT LEVER - RECORD
4. AGC control - Minimum (Not Off)
5. MARK LEVEL control - Approx. #5
6. BAND SELECTOR - NARROW
7. RECORD LEVEL control - approx. #20
8. FL1-HS-FL2 switch - FL-1
9. INPUT SELECTOR - Appropriate Impedance

B. Feed a 1KC signal into the INPUT jack, and adjust the RECORD LEVEL for a 0 VU meter reading; monitor the input with an AC VTVM.

C. Switch to REPRODUCE, and adjust the REPRODUCE LEVEL to obtain a -2 VU reading.

D. Place a fresh sheet of Sonagram paper on the DRUM.

E. Ascertain that the REED SWITCH contact is within 1/16" of a MAGNETIC PIN.

F. Lift the stylus to a point where the 1 KC signal will produce a mark on the paper. (Note: Frequency range is inverted when making SECTION patterns.)

G. Feed in other frequencies such as 1.5 KC, 2 KC, 2.5 KC, 3 KC etc. Decrease the input level 6 DB each time and mark the paper. (Different frequencies are used to prevent one pattern from obscuring another.)

H. Do not change the RECORD or REPRODUCE LEVELS from the values of steps (2) and (3).

I. Each pattern will represent approximately a 6 DB change, and can be measured by using the scale - 1/32" = 1 DB.

5.3 OVERALL RESPONSE

A. Perform steps (A) through (F) as in Section 5.2.

B. RECORD and REPRODUCE frequencies throughout the range of the 6061-A (Do not change the RECORD - REPRODUCE LEVELS set earlier).

C. Monitor the input amplitude to assure a flat response over the various frequencies.

D. Check the SECTION patterns for a flatness of $\pm$2 DB (1/32" as equal to 1 DB).

5.4 AMPLITUDE DISPLAY (OPTIONAL)

A. Set controls as in step A, Section 5.2, except for the SECTIONER switch, which should be off.

B. Switch the 6076-A plug-in to AMPLITUDE DISPLAY.

C. Feed a 1 KC signal to the INPUT jack, and adjust its amplitude to obtain a 0 VU meter reading.

D. Switch to REPRODUCE and place the Mechanical SHIFT LEVER in REPRODUCE.

E. Lift the stylus to a point just below the upper SHORT POINT and adjust the REPRODUCE LEVEL control until the BASELINE INDICATOR lights; then engage the stylus and mark the paper.

F. Decrease the REPRODUCE LEVEL 6 DB by rotating the control 3 'clicks' CCW - make a pattern.

G. Repeat the preceding step until a total of four patterns have been made.

H. Now, move the stylus to a point about one-third the way down the Sonagram paper and, while depressing the BASELINE switch, engage the stylus. Hold down the switch until the baseline has been marked on the paper.

I. The distance between each pattern will represent approximately 6 DB, for a total of 24 DB above the baseline. (Approx. 9/32 inch = 6 DB).

5.5 SYSTEM BANDWIDTH (Using Scale Magnifier)

A. Set controls as in Step A, Section 5.4.

B. Feed a 1 KC signal into the INPUT jack, and adjust its amplitude to obtain 0 VU meter reading.

C. Switch to REPRODUCE and adjust the REPRODUCE LEVEL to obtain -2 VU.

D. Lift the stylus to a point just below the upper SHORT POINT; then adjust the UPPER LIMIT control for a 1 KC indication on the BASELINE INDICATOR.

E. Move the stylus to a point just above the lower SHORT POINT; then adjust the LOWER LIMIT control for a baseline indication on the BASELINE INDICATOR.

F. Repeat, if necessary, the two preceding steps until both extremes are aligned.

G. Turn the SECTIONER switch to the ON position, and make a SECTION pattern showing the baseline and the 1 KC signal. (Note: The SECTION pattern will not have an inverted frequency scale when the SCALE MAGNIFIER is being used).

H. Switch back to RECORD and feed a 500 CPS signal to the INPUT jack; adjust its amplitude to obtain a 0 VU meter reading.

I. Switch to REPRODUCE and adjust the REPRODUCE LEVEL for a -2 VU meter reading.

J. Make a section pattern of the 500 CPS signal.

K. The scales used to analyze this pattern are: 1/32" = 1 DB (Horizontal Direction) and 1/32" = 7.8 CPS (Vertical Direction).

L. To obtain the 3 DB points on the curve, measure 3/32's of an inch horizontally from the peak of the curve. Then draw a vertical line through this point. The two places at which this line crosses the 500 CPS curve are the 3 DB points.

M. Now, measure the distance between these two points; record this distance and calculate the bandwidth using the scale of step K.

N. Switch the BAND SELECTOR to WIDE, and repeat this procedure.

Reed Switch contacts should be no more than 1/16 inch away from any magnetic pin or within 1/8 inch of any pin on units with serial numbers above 36032. Should the switch block be positioned more distant from the pins than noted above, the SECTIONER might fail to function or intermittent marking would be present.

Avoid leaving spare magnetic pin(s) in storage holes adjacent to the pin(s) in use. The magnetic properties of the spare pin might tend to disturb the magnetic field of the pin in use, thus causing the SECTIONER to function abnormally.

Although the 500 CPS calibration tone can be utilized during recording, insertion is easier in the REPRODUCE mode. After "capturing" the desired signal, adjust the MONITOR LEVEL to a convenient volume and, leaving the mechanical system in the record speed, depress the 500CPS CALIB switch at the desired interval.

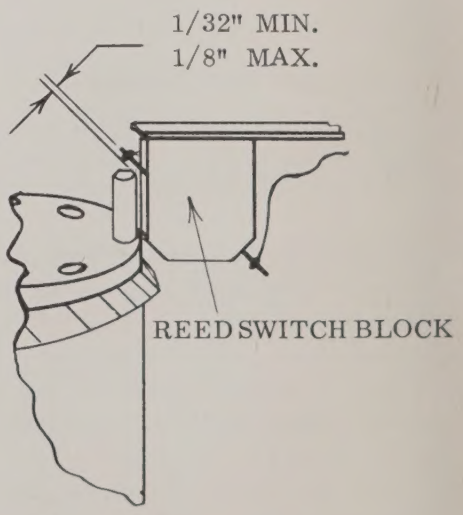
Utilize the BASELINE and SHORT POINT indicators in conjunction with the BASELINE ADJUST to facilitate baseline setting. With the mechanical system in neutral, raise the Stylus Control Lever until the SHORT POINT light just goes out; set the BASELINE ADJUST for maximum brilliance of the Baseline Indicator. This control should also be readjusted when switching the FREQ. SCALE from LIN to LOG and vice-versa.

Avoid leaving the Mechanical Shift Lever in either RECORD or REPRODUCE when the 6061-A is idle. (When the unit is connected to 117V source, the Alarm Buzzer will sound if the Shift Lever is in gear). With the Shift Lever in the OFF position, the drive wheels are disengaged, thus preventing flat spots from occuring.

During periods of storage or transit it is good practice to replace the Red Packing Plate (original packing) so that the Shift Lever will not be inadvertantly placed in gear.

Cleanliness of the RECORD - REPRODUCE head, ERASE head and the TURNTABLE are essential for clear, accurate information contained on the Sonagram. Indications of dirty heads and/or turntable are: abnormal (faint) markings on the high frequency part of the pattern (use 500 CPS CALIBration tone for confirmation), and low readings on the Reproduce VU meter. Trouble may be remedied by cleaning both heads and turntable with a clean cloth dampened with carbon tetrachloride. Also remove and clean the felt pad, adjacent to the heads, with carbon tetrachloride and apply a few drops of a light machine oil before replacing.

Cleanliness of the stylus assembly component parts and proper adjustment of the stylus is also necessary for clear sharp patterns. The stylus wire itself should be cut to protrude approximately 1/4" from its housing. When engaged it should rest lightly on the paper with a slight angle to it. Improper stylus adjustment is indicated by abnormally light or dark, Sonagrams. Random dark, horizontal streaks on the pattern is an indication of a dirty stylus resistor. Information concerning disassembly and cleaning of the stylus assembly is contained in the Maintenance Manual.



REED SWITCH ASSEMBLY
LATE MODEL SONAGRAPHS